Space Weather Forecast

Issued on Sunday, 13 August 2023 at 01:11 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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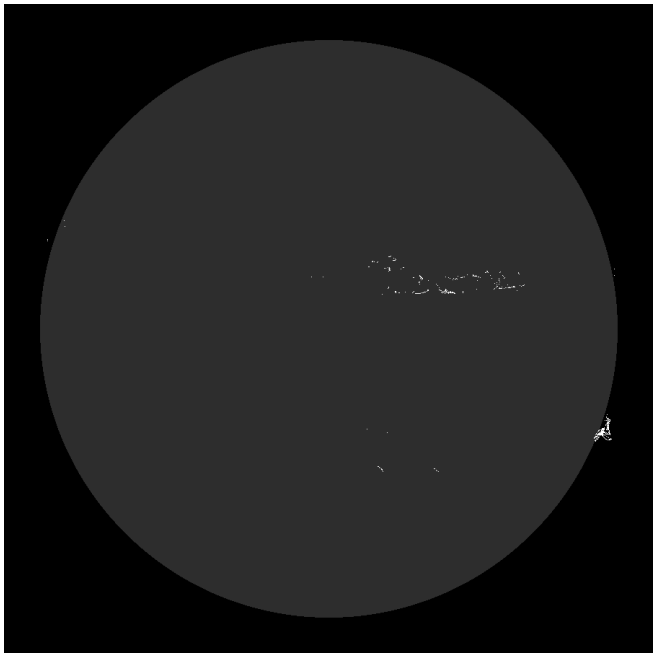
Space Weather Forecast Headline: Peak Chance of Minor Geomagnetic Storm G1 Monday 14 August UTC, perhaps with a lesser peak midweek. Chance of Minor Radio Blackout R1 throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low through the UTC day of Saturday 12 August, with the peak flare observed an upper-tier Common-class flare at 012/0915UTC from the most complex region in the northwest.

Figure 1: SIDC ROB visualisation of the emission locations of Common-class X-ray flares and above in the past 72 hours – the sunspot responsible for the peak flare of the last 24 hours in the upper right (northwest) can be seen to be predominant in terms of activity, even if these have yet to reach Moderate-class.



There are now up to five active regions on the facing side, as although a new magnetically bipolar region has developed in the southwest, a couple of unipolar candidates for regions faded. The most complex region on the facing side of the Sun remains the aforementioned in the northwest, however this has decayed areally and is now showing signs of simplification. A spot group to its east, meanwhile, developed more spots in the period, particularly in its trailing regions, although this was not capped by significant activity. Finally, a third main region in the southeast showed decay in its minor spots.

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While there were some Coronal Mass Ejections (CMEs) visible on satellite imagery in the period, these mainly appear to be linked with the far-side western hemisphere to no effect at Earth. No CMEs are thought to be en route at present.

Solar Wind / Geomagnetic Activity: Solar winds remained slightly elevated, most likely the result of a weak connection to a minor 'coronal hole' fast wind. While the source is not clear from extreme UV imagery, the geomagnetic effect in any case has been largely inconsequential.

The solar wind speed decreased slightly within slightly elevated levels in the 24 hours, while the number of particles remained within its long-term average values. The associated magnetic field was also within its typical background range, falling slightly from an early high, with a smoother character developing as the day went on. The north-south component showed no protracted periods either aligned or anti-aligned with Earth's field.

The net result of the above solar wind measures was for quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, with high-energy proton flux continuing to erratically ease, very roughly from 0.5 to nearer 0.25pfu, i.e. very near resting background levels given S1 (Minor Solar Radiation Storm) is 10pfu. This enhancement was due to the 07 August Strong X-ray flare from a long-departed sunspot that is now diametrically opposite the Earth on the far side of the Sun.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily chance of isolated Moderate-class flares, perhaps most likely from the most complex in the northwest. Two of the current front-sided regions are due to depart midweek (UTC), and as such a slight reduction in risk is forecast, with any compensatory arriving sunspot regions from the eastern solar horizon yet to manifest.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. The next fast wind enhancement is expected on day 2 (Monday 14 August). Initially mainly quiet geomagnetic activity should therefore give way to a chance of G1 Minor Storm intervals, with the risk of this peaking on Monday. A transition to a second (probably less potent) fast wind is then a possibility on Wednesday 16 August, with a secondary peak and slight chance of G1.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with the high-energy proton flux expected to soon reach resting Background, with only a slight chance of rising in response to any flares from the most complex region(s).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	50	10	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	30
Very Active	R3 to R5 X	No	5	5	5	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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